

## DOCUMENT RESUME

ED 104 140

FL 006 760

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TITLE Glide Metatheses. Working Papers in Linguistics, No. 14.  
INSTITUTION Ohio State Univ., Columbus. Dept. of Linguistics.  
PUB DATE Apr 73  
NOTE 13p.  
EDRS PRICE MF-\$0.76 HC-\$1.58 PLUS POSTAGE  
DESCRIPTORS Acoustic Phonetics; American Indian Languages; Articulation (Speech); Generative Phonology; Greek; Hungarian; \*Linguistic Theory; Malayo Polynesian Languages; \*Phonetic Analysis; \*Phonological Units; \*Phonology; Semitic Languages; Syntax; \*Transformations (Language)  
IDENTIFIERS \*Glides; Metathesis

## ABSTRACT

The purpose of this paper is to determine whether the sounds, *ʔ*, *h*, *y*, and *w* function as a natural class by investigating the following languages that have a metathesis rule affecting these sounds: Yagua, Zoque, classical Greek, Mandaic, Akkadian, Hanunoo, Tubatulabal, Twana, and Hungarian. The paper is divided into four parts. Section 1 briefly describes the rules in the nine languages chosen for the study. Section 2 explores the possibility of an implicational hierarchy of glides. Section 3 consists of some hypotheses about the motivation for metathesis, and the final section is a list of six additional languages which, because of insufficient data, are not included in the main arguments of the paper.  
(Author/PMP)

## Glide Metatheses

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0. Introduction.

The purpose of this paper is to determine whether the sounds  $\eta$ ,  $h$ ,  $y$ ,  $w$  function as a natural class by investigating languages that have a metathesis rule affecting these sounds. A natural class is a group of sounds that share articulatory and/or acoustic features and function similarly with respect to phonological rules. Good evidence for a natural class would come from an implicational hierarchy of sounds that undergo a certain rule. In addition there is the question of why glides are especially prone to metathesis. I will propose several hypotheses concerning the phonetic and phonological motivations for such a process.

The paper is divided into four sections. First I briefly describe the rules in the nine languages chosen for study. Section II explores the possibility of an implicational hierarchy of glides. Section III consists of some hypotheses about the motivation for metathesis, and Section IV is a list of six additional languages which, because of insufficient data, are not included in the main arguments of the paper.

1. Rules.

The following nine languages metathesize glides with consonants. They are briefly described with examples. ( $\rightarrow$  indicates a synchronic process and  $>$  a diachronic one.)

(1) Yagua (Fowlison 1962), a South American language. The glide is  $y$ , and it metathesizes with any consonant:  $yC \rightarrow Cy$ . For example,  $raY$  '1 sg', +  $haa$  'water'  $\rightarrow$   $rahyaa$  'my water'.  $raY$  +  $taaryoY$  'buy' +  $raay$  'desiderative' +  $ra$  'inanimate object'  $\rightarrow$   $ratyaaaryoYra$  'I want to buy it'.

(2) Zoque (Wonderly 1951) a Mexican language. There are two metathesis rules, one with  $y$  (Zoque<sub>1</sub>) and one with  $\eta$  (Zoque<sub>2</sub>). The Zoque<sub>1</sub> rule is:

$$y \quad [-voc]$$

$$1 \quad 2 \quad + \quad 2 \quad 1$$

conditions: (a)  $2 \neq h$ ; (b) when an  $e$  precedes  $1, 2 = \eta$ .

y metathesizes with a following consonant or glide, except h; and when y is preceded by e, it metathesizes with the glottal stop only. For example, y pronominal prefix + pata 'mat' → pyata 'his mat', kuy 'seven' + may suffix → kumyay 'a week hence', Ny prefix + wiht 'to walk' → nwyihtu 'you walked', re-y 'king' + ?aqa suffix → re-?yaqa 'to the king', but tey 'there' + ma suffix → tey<sup>h</sup>ma 'there'. There is some indication that the rule is becoming more general: condition (b) is generalizing such that eyt + eyt<sup>y</sup>, as in tey + tih suffix → teyt<sup>y</sup>ih 'right there'. Here y has palatalized the following t although it still precedes it.

The Zoque<sub>2</sub> rule is

nasal  
{liquid}

1      2      +      2 1

For example, kom 'post' + ?aqa suffix → ko?maqa 'to the post', lugar 'place' + ?oyh suffix → luga?royh 'at the place', perol 'copper kettle' + ?is suffix → pero?lis 'of the copper kettle'.

(3) Classical Greek (Kiparsky 1967). The glides y and h metathesize with a preceding resonant.

|   |          |          |         |
|---|----------|----------|---------|
| V | resonant | y<br>{h} |         |
| 1 | 2        | 3        | > 1 3 2 |

conditions: (a) when 2 = u, 1 = any vowel;  
(b) when 2 = l, r, m, n, 1 = a, o;  
(c) 2 ≠ h, y

For example, \*morya > moira 'lot', \*phanyō > phainō 'share', \*ekrinha > \*ekrihna (> ékri<sup>h</sup>na) 'judged'.

(4) Mandaic (Malone 1971), a Semitic language. h and ? metathesize with a preceding consonant.

|   |   |             |         |
|---|---|-------------|---------|
| V | C | {<br>h<br>} |         |
| 1 | 2 | 3           | + 1 3 2 |

condition: 3 = 3rd radical of the root.

For example, yarhā > yahrā 'mouth', mišhā > miššā (> miššā) 'oil', tirā > \*ti<sup>h</sup>rā (> tirā) 'door', but eḥāmbal 'was spoiled' where h is the first root consonant.<sup>1</sup> Malone also suggests that there was a y-metathesis at an earlier stage of Mandaic. But the environment, if correct, is highly constrained, namely ā N y > ā y N. There are only a few examples, plus a number of non-metathetic forms of the same morphological structure.

(5) Akkadian (Malone 1971). Malone believes the Mandaic rule also applied in Akkadian, except that segment 3 includes the class of all glides--w, y, h, ?. According to Reiner (1966), Akkadian w, y fell together with ? at some period, and it is not known whether this historically preceded or followed operation of the metathesis rule.

(6) Hanunóo (Gleason 1955), an Austronesian language. A ? metathesizes with a following consonant: ?C → C?. In the following examples, ka- is a prefix. \*?sa: kas?a 'once' but ?usa 'one', \*?pat: kap?at '4 times' but ?upat 'four', \*?num: kan?um '6 times' but ?unum 'six'.

(7) Tūbatulabal (Voegelin 1934), an Amerindian language. h metathesizes with a following resonant in final position.

h resonant #  
1 2 3 + 2 1 3

The h then assimilates to the resonant if it is a liquid or a nasal. For example, pōnihwīq 'of the skunk': pōniwh 'the skunk', ha/ayahli 'the trout (obj.)': ha?ayall 'the trout (subj.)', tsō·hni?īq 'my gray fish': tsō·nq 'his gray fish'.

(8) Twana (Drachman 1969). There are two<sup>2</sup> glottal attraction rules, whereby ? and h are moved toward the stress. For example, dəqhas + dəqhas 'one' and w?d-wədaW + wd?-wədaW 'horns'. There is also an optional y-metathesis:

$\begin{bmatrix} C \\ -\text{voi} \end{bmatrix}$   
1 2 + 2 1

as in ys?-yəsad ~ sy?-yəsad 'feet'.

(9) Hungarian (Hall 1944, Harms 1968). There is an h-metathesis, such that

resonant h {<sup>#</sup><sub>C</sub>}  
1 2 3 + 2 1 3

h cannot appear in syllable-final position. For example, \*terh- + -ek 'plural' → terhek 'burdens', but teher 'burden' (with epenthetic e), \*kel'h + -et 'accusative' → kel'het 'cup (acc.)', but \*kel'h + -ben 'in' → kehl'ben 'in the cup', \*kehl + -ek + kejhék 'chalices', but kehél 'chalice'.

## 2. The Hierarchy.

It has been assumed here and argued by others (Chomsky and Halle 1968, Zwicky 1969, 1972, and elsewhere) that the glottals (or laryngeals) ʔ and h should be treated as glides, and that they form a natural class with the semivowels w and y. There is both phonological and phonetic evidence to support this classification, for instance the facts that nasalization spreads through both glottals and semivowels and that neither group has a vocal tract constriction that impedes spontaneous voicing (glottals have no tract constriction at all).

The next question to ask is whether these segments function as a natural class in metathesis specifically. There are two possibilities for an implicational hierarchy in each group:

- (1) ʔ ↑    (2) h ↑    (3) y ↑    (4) w ↑  
       h |        ʔ |        w |        y |

What the notation in (1) means is that if the language metathesizes h and if ʔ occurs in the same environment, the language will metathesize ʔ too, but not the reverse. Likewise for (2)-(4). Obviously (1) and (2) cannot both be true, nor can both (3) and (4). In fact, (1) and (3) are correct. Of the six languages that metathesize h, either (a) the language does not have phonemic ʔ (Hungarian, Greek), (b) ʔ does not occur in the right environment for the metathesis (Tübatulabal), or (c) the language does metathesize both ʔ and h (Twana, Mandaic, Akkadian). (2) cannot be correct because Manunõo and Zoque<sub>2</sub> metathesize only ʔ. Regarding hierarchy (3), the only language that metathesizes w is Akkadian, and it also affects y. But Greek, Yagua, and Zoque<sub>1</sub> all metathesize only y. Thus (4) cannot be correct.

Having established (1) and (3) as implicational hierarchies, we would like to determine if there is one hierarchy for all the glides. The possibilities are:

- (5) ʔ ↑    (6) y ↑  
       h |        w |  
       y |        ʔ |  
       w |        h |

Taking (6) first, which I will show is not correct, it would have to be shown that every language that metathesizes y (or ʔ and h) also metathesizes w and ʔ, if they occur in the right environment. This condition does not hold in Tübatulabal, Twana, Mandaic, or Greek. On the other hand, to show that (5) is true, it would have to be shown that any language that metathesizes y (or w and y) also metathesizes h and ʔ, if they occur in the right environment. There are four languages that metathesize y (not counting the optional rule in Twana or the presumed y-metathesis in Mandaic, neither of which are counterexamples). The languages are Greek, Yagua, Akkadian, and Zoque<sub>1</sub>. Hierarchy (5) holds for Greek, which takes h (and doesn't have ʔ); Akkadian, which takes all the glides; and Yagua,

where h doesn't occur in the right environment and ? doesn't occur at all. Zoque<sub>1</sub> is the one counterexample. Both ? and h occur in the same environment as y, but neither undergoes the metathesis rule.

Recall that Zoque has two rules:

(1) y C

1 2 → 2 1

(2)  $\begin{pmatrix} N \\ L \end{pmatrix}$  ?

1 2 → 2 1

If rule (1) were generalized to metathesize the class of all glides with any consonant, then ? (a glide) would metathesize with liquids and nasals (members of the class of all consonants); the effect would be to undo rule (2). That is, part of one rule would be the exact reverse of the other rule, and the effect of rule (2) would never be visible on the surface. For a language to admit such a pair of processes would be extraordinary. I claim that Zoque is an explicable counterexample to hierarchy (5); to avoid mirror-image processes the Zoque<sub>1</sub> rule is constrained to take y alone, instead of y, h, and ?.

In general then, I conclude (tentatively, because of the paucity of the data) that the class of glides, ?, h, w, y, does function as a natural class in metathesis.

### 3. Motivations.

In searching for a phonetic motivation for glide metathesis, at least two factors have to be taken into account--the language-specific phonological constraints on where glides can occur in syllables and clusters, and the class of segments with which the glides metathesize. The following is a list of the surface phonological constraints on the occurrence of glides in some of the languages in the preceding section.

| <u>Language</u>       | <u>Surface Constraint</u>                                                     |
|-----------------------|-------------------------------------------------------------------------------|
| 1. Yagua              | yC is prohibited.                                                             |
| 2. Zoque <sub>1</sub> | yC is prohibited (with some conditions).                                      |
| 3. Zoque <sub>2</sub> | ? cannot occur as the last member of a cluster; must be preceded by a vowel.  |
| 4. Hanunóo            | ? cannot occur as the first member of a cluster; must be followed by a vowel. |
| 5. Tübatulabal        | h can be syllable onset or offset only.                                       |
| 6. Hungarian          | h occurs only as a syllable onset.                                            |

Not included are Greek, Mandaic, Akkadian, and Twana, whose metathesis rules do not reflect a specific constraint on the occurrence of certain glides.

Simply to list the surface constraints against certain clusters and syllable structures does not explain why a language 'chooses' metathesis as a way of resolving the disfavored sequence. One thing we must look at is the class of segments with which the glides metathesize. In no language in this sample does a glide metathesize with only one member of a class, e.g., no language exchanges *h* with *r* but not with *l*, or switches *y* with *k* but not with all stops. In fact, environments for glide metathesis fall into two sets: the class of all consonants and the class of all resonants.

In searching for a phonetic basis for metathesis, the first thing to look at is directionality. The following list shows the direction in which the glide moves in each rule.

|                    |   |
|--------------------|---|
| Yagua              | → |
| Zoque <sub>1</sub> | → |
| Zoque <sub>2</sub> | ← |
| Greek              | ← |
| Mandaic            | ← |
| Akkadian           | ← |
| Hanunóo            | → |
| Tibatulabal        | → |
| Twana              | ↔ |
| Hungarian          | ← |

There seems to be no preferred direction; in fact the sample is split practically in half. But if we look more closely at the type of glide that moves and the environment in each language, some generalizations appear.

Yagua and Zoque<sub>1</sub> are the only languages that metathesize *y* from left to right and with any consonant. (Greek and Akkadian take *y* to the left over resonants and consonants, respectively.) It is also true that Yagua and Zoque have extensive palatalization. The claim I would like to make is that in both languages, the metathesis rule is really a subpart of a general tendency in the language to palatalize consonants. This hypothesis would further explain the fact that the Zoque<sub>1</sub> rule is the only counterexample to hierarchy (3) in the preceding section. If the rule that moves *y* to the right of a consonant is really a reflection of Zoque's tendency towards palatalized consonants, then we would hardly expect *h*, ? to undergo the same rule, since they have no place in the palatalization process.

Discounting Twana, whose rules go in both directions, there are five languages that metathesize glides from right to left: Zoque<sub>2</sub>, Greek, Mandaic, Akkadian, and Hungarian. As a possible phonetic motivation for this similarity, I suggest that metathesis serves 'glide attraction' toward the vowel nucleus. By this I mean that glides tend to act as offglides to the vowel nucleus instead of onsets to the following syllable; I am claiming that the preferred syllable position for glides as a class is immediately following the

vowel, other things being equal. Leftward glide metathesis then accords with what David Stampe (personal communication) calls the 'hierarchy of relative sonority', whereby the vowel, being the most sonorous element, constitutes the syllable peak, while toward the margins the order is glide, liquid, nasal, obstruent.

On this basis, the sequences (a) VCGV and (b) VCGV both satisfy the hierarchy if the syllable boundary in (a) follows C, and may follow either G or C in (b). But in fact the hierarchy is somewhat restricted due to the tendency for all syllables to start with a consonant (that is, an obstruent, nasal, or liquid). Thus, I am claiming that (a) will reorder C and G so that the second syllable will start with a consonant, and that the syllable boundary in (b) will follow G. Glide attraction then, is a universal phonological process which is realized (for some languages) as a leftward metathesis.<sup>3</sup>

It should be kept in mind that both of my functional explanations--metathesis serving palatalization and metathesis yielding a preferred syllable shape--are based on the quite small number of languages with glide metathesis and do require much further investigation.

Three of these five languages (Hungarian, Greek, and Zoque<sup>2</sup>) limit the environment to resonants. This is significant because the resonants as a class are prone to a number of phonetic changes which indicate that they are more 'weakly' articulated than obstruents. For example, liquids and nasals become syllabic, nasalization spreads through them, liquids metathesize with vowels, and they frequently dissimilate. So it is not surprising that they are also subject to glide metathesis.

Treating glide metathesis as reflecting two processes--palatalization for the forward movement of y, and glide attraction for the backward movement of glides in general--leaves three languages in this study unaccounted for: Twana, Hanunóo and Tübatulabal. Recall that Twana moves ? and h over one or two segments toward the stress, Hanunóo moves ? to the right of any consonant, and Tübatulabal moves h to the right of a resonant in word-final position. Notice that in the last two languages the input to the metathesis rule is exactly the ideal syllable structure that I have argued is the output of backward (left) metathesis. In Hanunóo and Tübatulabal the output is (a) instead of (b).

(a) C { $\begin{smallmatrix} C \\ R \end{smallmatrix}$ } G

(b) V G { $\begin{smallmatrix} C \\ R \end{smallmatrix}$ }

We might view these exceptions as indicating the relative 'strength' of phonological processes. In Twana, for example, we might say that the attraction of glottals toward the stressed segment of the stem is a stronger rule than the universal tendency to put glides to the right of vowels.

In Hanunóo on the surface a ? must be followed by a vowel. But in order to account for certain morphophonemic alternations (see examples in Section 1), an abstract underlying form with the sequence ?C must be postulated. To account for alternations like ?usa 'one' and kas/a 'once', I claim that there are two metathesis processes here,

which serve two requirements of the language: no syllable starts with a vowel, and ? must be followed by a vowel. Regarding the first, Conklin (1953) says that all borrowed words of the form #VC- become #?VC- in Hanunóo. The following treatment has been suggested by Drachman (personal communication): for the above words, the underlying form is \*?sa, the u is an infix in ?usa, and when ka- is prefixed, the cluster ?s metathesizes. But I would suggest that u is a prefix, just like ka-, and because 'one' would then begin with a vowel (\*u?sa) the sequence u? is metathesized to ?u. Thus, the metathesis goes in either direction, depending on which constraint is being violated. It goes to the left to prevent the syllable from beginning with a vowel, and to the right to ensure that a vowel follows ?. The point of this argumentation is to illustrate that a natural state of affairs, like a favored syllable structure, can be overruled by a surface phonological constraint, which therefore must be said to have greater strength.

The third exception is Tübatulabal, where final hR becomes Rh. The constraint is that h can be either a syllable onset or offset, but never the first member of a cluster that closes a syllable (which will always be word-final position). If h precedes an obstruent, it becomes x, but before a resonant, the metathesis rule applies. Again, the surface constraint is stronger than the process making glides into vowel offsets.

Before we take the explanations for these three languages entirely seriously, two questions must be raised. (1) Does the notion 'relative strength' of a phonological process actually reflect a reason why it, rather than some other process, applies? (2) Do surface constraints express phonological conspiracies that ensure an appropriate phonetic output, or are they simply statements of what appears on the surface? Based on the limited data in this study, I have no elucidating answer to either question. Independent evidence is needed to show that in (1) 'relative strength' is a reality, and in (2) the constraints that prevent the universally favored syllables from occurring reflect some other universal tendency, or at least that there are other manifestations of a conspiracy in the language.

In summary, glide metathesis, as a phonological process, serves one of several purposes in natural language. (1) It reorders consonants and glides such that glides are vowel offsets. I consider this output the natural state of affairs in universal syllable structure. (2) It is one of the ways in which languages with extensive palatalization realize palatalized consonants. (3) It is a means of preventing certain concatenations of elements on the surface, that is, inadmissible clusters for that language. We would expect then, that in the absence of requirements like (2) or (3), (1) would apply. Needless to say, a larger sample of languages that evidence glide metathesis is necessary to test these hypotheses.

#### 4. Additional languages.

This section contains a brief annotated list of six additional languages that employ a glide metathesis rule. In these cases I was

unable to obtain enough information concerning the frequency of and constraints on the rules to include them in my main arguments. They are mentioned here as starting points for future research and testing of the hypotheses discussed in Sections 2 and 3.

- (1) Aymara Quechua (Mary Haas, class notes).

$\begin{pmatrix} l \\ n \end{pmatrix} w$

1 2 + 2 1

Supposedly *w* does not metathesize with any other consonants, making Aymara a potential counterexample to the semivowel hierarchy--if *y* occurs in the proper environments. The rule is also optional.  
calŷwa ~ čawlŷa 'fish', k'anwa ~ k'awna 'egg', č'ilwi ~ č'iwli 'chick'.

- (2) Southern Estonian (Kiparsky 1967, 623n). *Rh* > *hR*. I have three examples borrowed from Finnish. Fin. jāuhan > Est. jahvan 'I grind', Fin. kārhu > Est. kahr 'bear', Fin. vāha > Est. vahn 'old'. The leftward movement over a resonant supports the glide attraction hypothesis in Section 3, but I don't know what the constraints are on the occurrence of *h*.

- (3) Harari (Leslau 1963, 9). *hr* + *rh* and *fh* + *hf*. Metathesis is said to be very frequent in Harari, but I am unable to determine if it is systematic. agābāri gēhri + agābāri gērhi 'shepherd', fuddi fōhri + fuddi fōrhi 'worms of small children', bufhān + buhfān 'bladder'.

- (4) Kota (Emeneau 1967, 400-2). *VC* + *y* + *VyC*. *y* is the past tense marker for one class of verbs. This rule applies in over thirty words, but for every form where it applies, there are structurally identical forms where it does not. kūp + y + kūyp 'blow with breath', āk + y + āyk 'construct', ūt + y + ūyt 'fix into ground by pressure', taḷ + y + tayḷ 'push', but āt + y + āty 'climb', toḷ + y + toḷy 'disparage the good qualities of'.

- (5) Pāli, New Persian (Gray 1899, 241). *Ry* > *yR*. There are only a few examples, and I am unable to determine if the rule is systematic. If it is, it does follow the glide attraction hypothesis in Section 3. Pāli -ariya > -ayira, Skt. āccarya > Pāli \*acchayra 'miraculous', New P. any > ain, Avestan airyaman > New P. irmān 'quest'.

- (6) Old Spanish (Menéndez Pidal 1958, 48, 147, 185).

$C \begin{pmatrix} y \\ w \end{pmatrix}$

1 2 + 2 1

It is not at all clear whether semivowels are distinguished from vowels. The same rule is said to be needed for a synchronic study of Spanish morphology (Foley 1965). Vidua > viuda 'widow', caldariu > caldairo, sapiat > saipa, basiu > baiso. This rule may also be evidence for the glide attraction hypothesis.

#### Footnotes

1. According to Macuch (1965) Mandaic lost all ?s very early and they do not figure in the metathesis rule. This does not matter significantly, as I will explain in Section 3.
2. Ordering prevents them from being combined.
3. In Mandaic, Greek, and Akkadian, glide attraction is an intermediate process: VGC > VC or VCC. (See Malone, 409, 412n and Kiparsky, 620 for details of this development.) Macuch (1965, 84f.) has another explanation for the h-metathesis in Mandaic, namely to preserve the h from being lost as all the other pharyngeals and ʔ were. But h was optionally lost anyway, and I view the metathesis as a sort of 'h-retraction', the first step towards the subsequent loss.

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April 1973